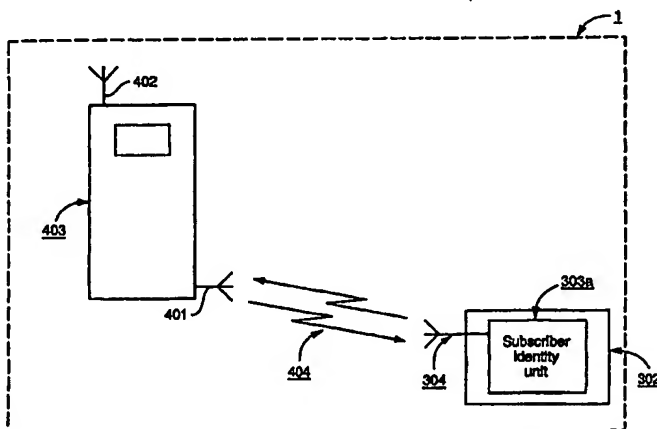




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : <b>H04Q 7/32</b>		A1	(11) International Publication Number: <b>WO 99/59360</b>
			(43) International Publication Date: 18 November 1999 (18.11.99)
(21) International Application Number: PCT/SE99/00734 (22) International Filing Date: 3 May 1999 (03.05.99) (30) Priority Data: 9801612-4 8 May 1998 (08.05.98) SE (71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). (72) Inventor: PETTERSSON, Mats; Sofiavägen 5 B, S-222 41 Lund (SE). (74) Agent: ERICSSON MOBILE COMMUNICATIONS AB; IPR Dept., S-221 83 Lund (SE).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published <i>With international search report.          Before the expiration of the time limit for amending the          claims and to be republished in the event of the receipt of          amendments.</i>	

(54) Title: A METHOD AND AN ARRANGEMENT IN A WIRELESS COMMUNICATION SYSTEM



## (57) Abstract

The present invention relates to an arrangement (1; 1a; 1b; 1c; 1d; 1e) for communication of subscriber identity module related data (901) in a wireless communication system (101). The arrangement comprises a wireless communication terminal (403; 403a; 403b; 403e; 403f) with a subscriber identity unit (303; 303a; 303b; 303c) which is adapted to comprise a subscriber identity module (201; 201a) to which a subscriber identity (902) is assigned. The present invention also relates to a method for communication of subscriber identity module related data (901) in a wireless communication system (101) for implementation in a wireless communication terminal (403; 403a; 403b; 403e; 403f) with a subscriber identity unit (303; 303a; 303b; 303c). The subscriber identity unit (303; 303a; 303b; 303c) is arranged to communicate the subscriber identity module related data (901) such as the subscriber identity (902) with the terminal (403; 403a; 403b; 403e; 403f) over a local wireless communication link (404; 404a; 404b; 404c; 404d). The arrangement according to the present invention makes it possible to separate the subscriber identity unit (303; 303a; 303b; 303c) from the terminal (403; 403a; 403b; 403e; 403f) while the terminal (403; 403a; 403b; 403e; 403f) is communicating in the wireless system (101).

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## A METHOD AND AN ARRANGEMENT IN A WIRELESS COMMUNICATION SYSTEM

### TECHNICAL FIELD OF THE INVENTION

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The present invention relates to an arrangement for communication of subscriber identity module related data in a wireless communication system. The arrangement comprises at least one wireless communication terminal with a subscriber identity unit which is adapted to comprise a subscriber identity module to which a subscriber identity is assigned. The present invention also relates to a station comprising a subscriber identity unit. The present invention also relates to a method for communication of subscriber identity module related data in a wireless communication system for implementation in a wireless communication terminal with a subscriber identity unit.

### DESCRIPTION OF RELATED ART

20 A subscriber identity is assigned to a terminal in a wireless communication system which uses a subscriber identity media. The wireless communication system determines, via a subscriber identity module (SIM) attached to the terminal, whether or not a subscriber requesting a communication service is a subscriber qualified to receive communication services which the system provides.

The term 'terminal', which also is referred to as a wireless communication terminal, includes all portable radio communication equipment to which a subscriber identity is assigned such as a mobile telephone, a communicator, i.e. a so called electronic organiser, or the like. The wireless communication system can for instance be any cellular mobile phone system such as GSM (Global System for Mobile Communications) or any satellite telecommunication system.

The SIM will now be described as implemented in a GSM network wherein the SIM is implemented as a card having a ROM (Read Only Memory), a RAM (Read Access Memory), an EEPROM (Electrically Erasable Programmable Read Only Memory), a

processor unit and an interface to the terminal. The memory of the SIM provides storage of the subscriber identity which is the International Mobile Subscriber Identity (IMSI) in a GSM network. The terminal can only be operated if a valid SIM is present except for emergency calls, when operation is allowed anyway. The SIM supports a security function for verification of the user of the terminal and for authentication of the user to the GSM network; the SIM is able to handle a personal identification number (PIN) which consists of 4 to 8 digits. If an incorrect PIN is entered to the terminal, an indication is given to the user of the terminal. After three consecutive incorrect entries the SIM is blocked. Blocking of a SIM puts it into a status which forbids GSM network operations. The SIM also contains information elements for GSM network operations. These elements can be related to the mobile subscriber, GSM services and information related to the public land mobile network (PLMN).

In a wireless communication system as described above it is convenient if the wireless communication system allows more than one terminal to share the same subscriber identity without having to pay for more than one subscription.

EP 711,090 describes a radio communication system wherein a plurality of subscriber identity modules implemented as cards and to be mounted to mobile stations share a single international subscriber identity. Consequently, a radio communication system capable of using a plurality of subscriber identity media sharing a single subscriber identity information is provided. This allows two or more different mobile stations to use the same international mobile subscriber identity without that the user have to pay for more than one subscription.

WO 94/08433 also describes a radio communication system which allows more than one mobile station to use the same international mobile subscriber identity without that the user have to pay for more than one subscription.

Though the above mentioned related art describe wireless communication systems which allow more than one terminal to share the same subscriber identity without having to pay for more than one subscription, there is a main disadvantage with the subscriber identity modules described in the above mentioned related art. The subscriber identity module may also be a carrier of other features than those previously described, such as being a card for economical transactions. Hence, the subscriber identity module may also be for instance a credit card and/or a cash card. If so, it is a disadvantage to have the subscriber identity module attached to the terminal. There is a further disadvantage with the subscriber identity modules described in the above mentioned related art. Information, such as mails and information in the address book and the calendar of a mobile station, saved on different subscriber identity modules attached to different mobile stations has to be synchronized in order not to diverge.

## **SUMMARY OF THE INVENTION**

The general problem dealt with by the present invention is to provide an arrangement and a method for communication of subscriber identity module related data for a wireless communication terminal in a wireless communication system.

A more specific problem dealt with by the present invention is to provide an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals which share a common subscriber identity, wherein the subscriber identity is assigned to one of the wireless communication terminals at a time.

A further more specific problem dealt with by the present invention is to provide an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals to which the same subscriber identity is assigned simultaneously.

A further more specific problem dealt with by the present invention is to provide an arrangement and a method for communication of subscriber identity module related data for a wireless communication terminal in a wireless communication system wherein the subscriber identity module is separated from the wireless communication terminal while the wireless communication terminal is communicating in the wireless system.

The problem is solved essentially by an arrangement for communication of subscriber identity module related data in a wireless communication system. The arrangement comprises a wireless communication terminal and a subscriber identity unit. The subscriber identity unit, which includes a subscriber identity module to which a subscriber identity is assigned, is arranged to communicate the subscriber identity module related data with the terminal over a local wireless communication link.

The arrangement according to the present invention makes it possible to separate the subscriber identity unit from the terminal while the terminal is communicating in the wireless system.

More specifically, the present invention also relates to a station comprising a subscriber identity unit.

More precisely, the present invention also relates to a method for implementation in a wireless communication terminal with a subscriber identity unit in a wireless communication system.

A general object of the present invention is to provide an arrangement and a method for communication of subscriber identity module related data for a wireless communication terminal in a wireless communication system.

It is another object of the present invention to provide an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals which share a common subscriber identity, wherein the subscriber identity is assigned to one of the wireless communication terminals at a time.

It is a further object of the present invention to provide an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals to which the same subscriber identity is assigned simultaneously.

It is a further object of the present invention to provide an arrangement and a method for communication of subscriber identity module related data which allow separating the subscriber identity unit from the terminal while the terminal is communicating in the wireless system.

A general advantage afforded by the present invention is that an arrangement and a method for communication of subscriber identity module related data for a wireless communication terminal in a wireless communication system are provided.

A more specific advantage afforded by the present invention is that an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals which share a common subscriber identity, wherein the subscriber identity is assigned to one of the wireless communication terminals at a time, are provided.

A further more specific advantage of the present invention is that an arrangement and a method for communication of subscriber identity module related data for at least two wireless communication terminals to which the same subscriber identity is assigned simultaneously, are provided.

A further more specific advantage afforded by the present invention is that an arrangement and a method are provided which allow two or more users of wireless communication terminals to use the same subscriber identity without having to pay for more than one subscription. Also, it is convenient that the same phone number can be used by more than one wireless communication terminal.

A further more specific advantage afforded by the present invention is that an arrangement and a method for communication of subscriber identity module related data for a wireless communication terminal in a wireless communication system wherein the subscriber identity module is separated from the wireless communication terminal while the wireless communication terminal is communicating in the wireless system are provided.

A further more specific advantage afforded by the present invention is that a user of a wireless communication terminal does not have to insert the subscriber identity module into the terminal.

A further more specific advantage afforded by the present invention is that a user of a wireless communication terminal can more easily alter which subscriber identity that shall be assigned to the terminal.

A further more specific advantage afforded by the present invention is that information saved on the subscriber identity module, such as mails and information in the address book and the calendar of a terminal, can be used by two or more users of wireless communication terminals.

The invention will now be described more in detail below with reference to the appended drawings which illustrate various aspects of the invention by means of embodiments. The invention is not limited to these embodiments.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a general schematic view of a wireless communication system in which a wireless terminal is located;

Figure 2 illustrates in a block scheme a subscriber identity module;



Figure 3 illustrates in a block scheme an embodiment of the present invention with a subscriber identity terminal including a subscriber identity unit;

5 Figure 4 illustrates in a block scheme an embodiment of an inventive arrangement with a wireless communication terminal and a subscriber identity terminal;

Figure 5 illustrates in a block scheme two inventive  
10 arrangements with two wireless communication terminals and one wireless station comprising a subscriber identity unit;

Figure 6a illustrates in a block scheme a base station and two  
15 inventive arrangements with two wireless communication terminals and one subscriber identity unit;

Figure 6b illustrates in a diagram a signalling communication  
according to the present invention between a base station and  
two wireless communication terminals and between the two  
20 wireless communication terminals and one subscriber identity unit;

Figure 7 illustrates in a block scheme an embodiment of an  
inventive arrangement with a wireless communication terminal and  
25 a wireless station comprising a subscriber identity unit;

Figure 8 illustrates in a flowchart a method according to the  
present invention for communication of subscriber identity  
module related data in a wireless communication system;

30 Figure 9 illustrates in a diagram a signalling communication according to the present invention between a wireless communication terminal, a subscriber identity unit and a base station of a wireless communication system.

35

#### DETAILED DESCRIPTION OF EMBODIMENTS

Figure 1 is a general schematic view of a part of a wireless  
communication system 101 which is a GSM network. The  
40 geographical area covered by the wireless communication system

101 is divided into cells C1-C5. Each cell C1-C5 provides radio coverage in a certain area and is allocated a certain set of frequencies for communication in that area.

- 5 Each cell C1-C5 is served by one base station BTS1-BTS5, called base transceiver station (BTS) in GSM terminology. The base transceiver stations are provided with means for transmitting to and receiving from a wireless communication terminal 403. The terminal 403 is currently located in the cell C1 in Figure 1.
- 10 The cell C1 in which the terminal 403 is currently located is called the serving cell and the base transceiver station BTS1 serving that cell is called the serving base transceiver station.
- 15 The terminal 403 comprises means for communication with the base transceiver stations BTS1-BTS5 in the wireless communication system 101 and is used by a subscriber to get access to the communication services provided by the wireless communication system 101. Each group of base transceiver stations is
- 20 controlled by a base station controller BSC1-BSC2. A number of base station controllers BSC1-BSC2 are controlled by a mobile services switching centre MSC. The mobile service switching centre MSC is responsible for switching calls to and from mobile stations located in the area served by the mobile services
- 25 switching centre MSC.

When a call is being established to or from the terminal 403, a communication channel CH dedicated for communication between the terminal 403 and the serving base transceiver station BTS1 is

30 allocated for the call.

The switching centre MSC is adapted to control the traffic within a GSM network, and also between this network and other networks connected thereto, such as a public telephone network

35 PSTN (Public Switched Telephone Network) or a GSM network of another operator (not shown in Figure 1).

Two different registers are also connected to the switching centre MSC, namely a home location register HLR containing

40 information on the system's own subscribers, and a visitor

location register VLR containing information on active, and consequently registered, visitors found in the coverage area of the GSM network. A visitor is either a home subscriber or a subscriber associated with another GSM operator. The information in the visitor location register VLR is always retrieved from the subscriber's home location register HLR and includes a subscriber identity 902 (see Figure 9) making it possible to positively identify and address a visitor. In a GSM network the subscriber identity is called the International Mobile Subscriber Identity (IMSI). If a registered visitor ceases to be active in the network associated with the visitor location register VLR, the information of him found in the visitor location register can be erased, in order to be retrieved from the home location register HLR if he becomes active again.

A billing administration support system BASS might be connected to the switching centre MSC, to the home location register HLR and to the visitor location register VLR. The billing administration support system BASS is an operator service that supports billing administration if a subscriber identity module 201 (see Figure 2) of the terminal 403 is used as a credit card or a cash card.

The wireless communication system 101 according to the present invention is not limited to a GSM network. It can for instance be any cellular mobile phone system such as a PCS network, any satellite telecommunication system or any other wireless communication system where the subscriber identity 902 is assigned to each wireless communication terminal which is active in the system. The access method used in a GSM network is time division multiple access (TDMA). However, in a wireless communication system according to the present invention any other access method is applicable such as frequency division multiple access (FDMA) or code division multiple access (CDMA).

Figure 2 illustrates in a block scheme a subscriber identity module 201.

The previously known subscriber identity module 201 in Figure 2 is described as implemented in a GSM network wherein the subscriber identity module 201 is implemented as a card having a read only memory ROM, a read access memory RAM, an electrically erasable programmable read only memory EEPROM, a processor unit CPU and an interface to the terminal I/O. The memory of the subscriber identity module 201 provides storage of the subscriber identity 902 (see Figure 9) which is the International Mobile Subscriber Identity IMSI in a GSM network. The terminal 403 can only be operated if a valid subscriber identity module 201 is present except for emergency calls, when operation is allowed anyway. The subscriber identity module 201 supports a security function for verification of the user of the wireless terminal 403 and for authentication of the user to the network. The subscriber identity module 201 is able to handle a personal identification number PIN which consists of 4 to 8 digits. If an incorrect PIN is entered to the terminal 403, an indication is given to the user of the terminal 403. After three consecutive incorrect entries the subscriber identity module 201 is blocked. Blocking of a subscriber identity module 201 puts it into a status which forbids GSM network operations.

Figure 3 illustrates in a block scheme an embodiment of the present invention with a subscriber identity terminal 302 including a subscriber identity unit 303 and a power supply 301. Both the subscriber identity terminal 302 and the subscriber identity unit 303 respectively are hereinafter also referred to as a station. The station is a device which comprises at least the subscriber identity unit and can hence be the subscriber identity unit itself.

The subscriber identity unit 303 comprises a subscriber identity module 201a and a first communication means 304. The first communication means 304 is a transceiver for communicating different types of data (see Figure 9) with a second communication means 401 of the wireless communication terminal 403 (see Figure 4).

The power supply 301 provides the subscriber identity module 201a and the transceiver with power.

Figure 4 illustrates in a block scheme an embodiment of an inventive arrangement 1 with the wireless communication terminal 403 and the subscriber identity terminal 302 including a subscriber identity unit 303a according to the present invention. The wireless communication terminal 403 and the subscriber identity terminal 302 are separated from each other. By separated is hereinafter meant at least electrically separated, but in a preferred embodiment of the present invention is meant both electrically and physically separated.

The subscriber identity terminal 302 and the subscriber identity unit 303a respectively are also referred to as a station. As mentioned previously, the station is a device which comprises at least the subscriber identity unit.

The wireless communication terminal 403 can for instance be a portable radio communication equipment such as a mobile station i.e. a mobile phone, a pager, a communicator, i.e. a so called electronic organizer, or the like. The wireless communication terminal can as well be a non portable radio communication equipment such as a telefax, a personal computer or an electronic organizer. The wireless communication terminal 403 can for instance be used for transmission and reception of voice, data or video.

The wireless terminal 403 comprises a second communication means 401. By means of the second communication means 401 which is a transceiver, the wireless terminal communicates different types of data (see Figure 9) over a local wireless communication link 404 with the first communication means 304 of the subscriber identity unit 303a comprised in the subscriber identity terminal 302. The local wireless communication link 404; 404a; 404b; 404c; 404d is defined as a local link between the first communication means 304 of the subscriber identity unit 303; 303a; 303b; 303c; and a transmitter and/or receiver locally positioned nearby the subscriber identity unit. In Figure 4 and in a preferred embodiment of the present invention, the

transmitter and/or receiver locally positioned nearby the subscriber identity unit is the second communication means 401 comprised in the wireless communication terminal 403. However, in another embodiment of the present invention a transceiver not  
5 comprised in the wireless communication terminal 403 is locally positioned nearby the subscriber identity unit (this embodiment is not shown in any Figure). In this embodiment the transceiver locally positioned nearby the wireless communication terminal 403 is transmitting, i.e. repeating, the signal received via the  
10 local wireless communication link to the second communication means 401 of the wireless terminal 403.

In Figure 4, the wireless terminal 403 comprises the second communication means 401 and a transceiver 402. The terminal 403  
15 communicates via the transceiver 402 with the wireless communication system 101 (see Figure 1). However, in another embodiment of the present invention the transceiver 402 for communication with the wireless communication system 101 is incorporated in the second communication means 401 of the  
20 terminal 403.

The local wireless communication link 404 can for instance be within a radio frequency range. In an embodiment of the present invention the local wireless communication link 404 is within  
25 the frequency range of approximately 2,4 GHz. The local wireless communication link 404 can also be within an infrared frequency range. However, the local wireless communication link can be any wireless link such as an electro-magnetic link, a magnetic link or an inductive link. Examples of electro-magnetic links are  
30 links within the microwave frequency range, the radio frequency range or the optic frequency range.

However, there is not much radio spectrum available for these kind of (private) applications. For instance, in the United  
35 States, the ISM (Industrial, Scientific, Medical) bands at 900 MHz, 2,4 GHz, and 5,7 GHz are unlicensed, and can be used freely, provided the transmission power levels are low or spreading is applied. The 2,4 GHz band is even available globally. In order to avoid interference, spreading should be

applied, either by frequency-hopping or direct-sequence spread spectrum.

Assume that the embodiment of the present invention wherein the  
5 2,4 GHz ISM band, which reaches from 2400 MHz to 2483,5 MHz, is  
used for the wireless local communication link 404. In order to  
avoid sharp filters to fulfil out-of-band emission requirements,  
the applied radio band is preferably placed away from the ISM  
band edges. Known interference areas, like the section from 2435  
10 MHz to 2465 MHz where micro-wave ovens are operating, are  
preferably avoided as well. FSK (Fast Shift Keying) can be used  
to map a user code on the radio frequency carrier. In the FSK  
modulation scheme, a bit representing 'zero' is mapped to the  
frequency  $f_{RF} + \Delta f$  and a bit representing 'one' is mapped to the  
15 frequency  $f_{RF} - \Delta f$  (the opposite is also possible) where  $f_{RF}$  is the  
carrier frequency. The frequency deviation  $\Delta f$  should be large  
enough to combat the frequency offset between transmitter and  
receiver. For example, if sloppy frequency references with an  
accuracy of  $\pm$  PPM (part per million) are used, the worst-case  
20 frequency offset can reach up to 240 kHz. In order to receive  
the burst in this case, the frequency deviation  $\Delta f$  should be  
larger than 240 kHz.

The local wireless communication link 404 is encrypted in order  
25 to establish a secure wireless communication link that hinders  
third party interception of sensitive information.

It shall be mentioned that it is possible to insert at least one  
repeater (not shown in any Figure) that repeats the information  
30 transferred via the wireless communication link 404 between the  
first communication means 304 and the second communication means  
401.

In an embodiment of the present invention the subscriber  
35 identity module 201a (see Figure 3), comprised in the subscriber  
identity terminal 302, carries additional features which makes  
it possible to use the subscriber identity terminal as a credit  
card or a cash card. It is an advantage if the subscriber  
identity module 201a carries many features. The billing

administration support system BASS (see Figure 1) then supports billing administration. In this embodiment, it is an advantage of the present invention that the subscriber identity module 201a is separated from the wireless terminal 403, since it then  
5 for instance is possible to carry the subscriber identity module 201a comprised in the subscriber identity terminal 302 in a wallet.

Figure 5 illustrates in a block scheme two inventive  
10 arrangements 1a; 1b with two wireless communication terminals 403a; 403b and a common subscriber identity unit 303b which are separated from each other.

The subscriber identity unit 303b is comprised in a station 403c  
15 which is a wireless communication terminal. As mentioned previously, the station is a device which comprises at least the subscriber identity unit. The subscriber identity unit 303b is connected to internal circuits 601 of the wireless terminal 403c. The internal circuits 601 include a controller.

20 The arrangement 1a comprises the subscriber identity unit 303b and the wireless communication terminal 403a which is a telefax. The wireless terminal 403a comprises both a transceiver 501a for communication in a wireless communication system such as GSM and  
25 also a second communication means which is a transceiver 401a for communication with the subscriber identity unit 303b.

The other arrangement 1b comprises the subscriber identity unit 303b and the wireless communication terminal 403b which is an  
30 electronic organizer. The wireless terminal 403b comprises both a transceiver 501b for communication in a wireless communication system such as GSM and also a transceiver 401b for communication with the subscriber identity unit 303b.

35 The subscriber identity module 201 (see Figure 2) of the subscriber identity unit 303b can either function as a subscriber identity module to the wireless terminal 403c or as a subscriber identity module to one of the two arrangements 1a; 1b, wherein the subscriber identity unit 303b communicates over  
40 a local wireless link 404a; 404b with one of the two wireless



terminals 403a; 403b. In an embodiment of the present invention one of the terminals 403a; 403b get under control of the subscriber identity unit 303b when one or both of the transceivers 401a; 401b detect the presence of the remote  
5 subscriber identity unit 303b. In a wireless communication system 101, this results in that all communication with a base transceiver station BTS1 over a communication channel uses either the transceiver 501a or the transceiver 501b (see Figure 1). In another embodiment of the present invention wherein the  
10 wireless terminal 403a and the wireless terminal 403b are physically close to each other, for instance closer than 10 meters to each other, they can have a mutual precedence regarding which one of the terminals 403a; 403b that shall respond to an incoming call from a base station. However, both  
15 of the terminals 403a; 403b shall establish a communication over the local wireless link 404a; 404b with the subscriber identity unit 303b.

An incoming call from a base station to a wireless terminal  
20 403a; 403b will be routed to the terminal 403a; 403b that get under control of the subscriber identity unit 303b.

In an embodiment of the present invention, the subscriber identity unit 303b comprises information in a memory 502 about  
25 which wireless communication terminals 403a; 403b that have the authority to communicate the subscriber identity module related data 901 (see Figure 9) over the local wireless communication link 404a; 404b with the subscriber identity unit 303b. In a GSM network the International Mobile station Equipment Identity  
30 (IMEI) is used to uniquely identify the wireless terminals 403a; 403b. The subscriber identity unit 303b may also contain information about the mutual precedence regarding which one of the terminals 403a; 403b that shall respond to an incoming call from a base station. The mutual precedence may vary depending on  
35 which type of services that an incoming call from a base station to a wireless terminal 403a; 403b provides; for instance there may be a first mutual precedence for voice services, a second mutual precedence for data services such as short message services SMS and a third mutual precedence for telefax services.  
40 For instance an incoming telefax call may be answered

automatically by the tele-fax 403a. The mutual precedence may either be determined automatically by the subscriber identity unit 303b or manually by a user. The mutual precedence may be determined manually by a user via a user interface (not shown in Figure 5) of either the subscriber identity unit 303b or of one of the wireless terminals 403a; 403b; 403c. A subscriber identity of an incoming call may also determine the mutual precedence.

10 The mutual precedence regarding which one of the terminals 403a; 403b that shall send an outgoing call from the wireless terminal 403a; 403b to a base station may be determined in accordance with which one of the transceivers 401a; 401b that is first to establish communication over a local wireless link 404a; 404b  
15 with the subscriber identity unit 303b. Accordingly the mutual precedence regarding reading information from and/or writing information on the subscriber identity module 201 (see Figure 2) may be determined in accordance with which one of the transceivers 401a; 401b that is first to establish communication  
20 over the local wireless link 404a; 404b with the subscriber identity unit 303b. Such information may for instance be information in the address-book or Short Message Services.

In an embodiment of the present invention both the terminals  
25 403a; 403b communicate in the wireless communication system 101 simultaneously wherein both the terminals 403a; 403b establish communication over both the local wireless links 404a; 404b simultaneously. In this embodiment particular identity information attached to each terminal 403a; 403b, which is the  
30 International Mobile station Equipment Identity (IMEI) in a GSM network, is used to distinguish the terminals 403a; 403b from each other.

In a preferred embodiment of the present invention, the memory  
35 502 is protected by means of the personal identification number PIN (see Figure 2). If information stored in the memory 502 about a terminal is to be deleted or if information about yet another terminal (not in Figure 5) beside the terminals 403a; 403b is to be added to the memory 502, the personal

identification number PIN must first be entered for instance via a keypad.

Figure 6a illustrates in a block scheme a base station BTS1 and two inventive arrangements 1c; 1d with two wireless communication terminals 403; 403f and one subscriber identity unit 303a.

The subscriber identity unit 303a is comprised in a station 302 which is a subscriber identity terminal 302. The subscriber identity terminal 302 comprises the first communication means 304 which is a transceiver.

The inventive arrangement 1c comprises the subscriber identity unit 303a and the wireless communication terminal 403 which is a mobile phone. The mobile phone comprises the second communication means 401 and the transceiver 402. The mobile phone communicates via the transceiver 402 over a communication channel CHa with the base transceiver station BTS1 of the wireless communication system 101 (see Figure 1). The mobile phone communicates via the second communication means 401 over a local wireless communication link 404c with the first communication means 304.

The inventive arrangement 1d comprises the subscriber identity terminal 302 and the wireless communication terminal 403f which is an electronic organizer. The electronic organizer comprises the second communication means 401a and a transceiver 402a. The electronic organizer communicates via the transceiver 402a over a communication channel CHb with the base transceiver station BTS1 of the wireless communication system 101 (see Figure 1). The electronic organizer communicates via the second communication means 401a over a local wireless communication link 404d with the first communication means 304.

It shall be mentioned that several wireless communication terminals (two terminals 403; 403f in Figure 6) can communicate with one subscriber identity unit 303a. Also one and the same terminal can communicate with different subscriber identity units (not shown in any Figure). Hence, it is possible for

several different subscribers of different subscriber identity units to communicate in a wireless communication system 101 (see Figure 1) even if only one wireless terminal is used.

5 Figure 6b illustrates in a diagram an inventive signalling communication between the base station BTS1 and the two wireless communication terminals 403; 403f and between the two wireless communication terminals 403; 403f and the subscriber identity unit 303a. The base station BTS1, the two wireless communication  
10 terminals 403; 403f and the subscriber identity unit 303a are illustrated in a block scheme in Figure 6a. For voice-communication, the wireless terminal 403 which is a mobile phone is a master over the subscriber identity unit 303a and over the wireless terminal 403f which is an electronic organizer.  
15 Accordingly, for data- and telefax-communication, the electronic organizer 403f is a master over the subscriber identity unit 303a and over the wireless communication terminal 403 which is a mobile phone.

20 In the signalling communication diagram illustrated in Figure 6b the local wireless link 404c (see Figure 6a) between the mobile phone 403 and the subscriber identity unit 303a and also the local wireless link 404d between the electronic organizer 403f and the subscriber identity unit 303a are already established.

25

Figure 6b illustrates a signalling communication for a data-call between the base station BTS1 and the electronic organizer 403f. In a first step 601b a request for a data-call from the base station BTS1 to the mobile phone 403 is made. In a next step  
30 602b a data-call notification from the mobile phone 403 to the subscriber identity unit 303a is made. In a next step 603b a data-call notification from the subscriber identity unit 303a to the electronic organizer 403f is made. In a next step 604b the subscriber identity unit 303a is signalling to the mobile phone  
35 403 that the subscriber identity unit 303a is busy. In a next step 605b the electronic organizer 403f answers the data-call from the base station BTS1. During the step 605b subscriber identity module related data 901 such as the subscriber identity 902 is communicated. In a signalling communication in a GSM  
40 network as in Figure 6b, the subscriber identity 902 is the

International Mobile Subscriber Identity (IMSI). In a next step 606b a data-call signalling communication is set-up between the electronic organizer 403f and the base station BTS1. In a next step 607b a data-call signalling communication is set-up between  
5 the electronic organizer 403f and the subscriber identity unit 303a. When the data call is to terminate, the data-call signalling communication between the electronic organizer 403f and the subscriber identity unit 303a is hang-up in a next step 608b. In a next step 609b the data-call signalling communication  
10 between the electronic organizer 403f and the subscriber identity unit 303a is hang-up. Finally, in a next step 610b, the subscriber identity unit 303a is signalling to the mobile phone 403 that the subscriber identity unit is idle.

15 Figure 7 illustrates in a block scheme an inventive authentication arrangement 1e with a wireless communication terminal 403e and a subscriber identity unit 303c which are separated from each other.

20 The subscriber identity unit 303c is comprised in a station which is the wireless communication terminal 403d. As mentioned previously, the station is a device which comprises at least the subscriber identity unit. The subscriber identity unit 303c is connected to internal circuits 601 of the wireless terminal  
25 403d. The internal circuits 601 include a controller.

The subscriber identity unit 303c comprises the first communication means 304 which is a transceiver. The transceiver 304 communicates over the local wireless link 404c with the  
30 transceiver 401 of the wireless terminal 403e. The wireless terminal 403e includes a voice activity detector VAD which is connected to an external microphone 602. Also an external speaker 603, an external processor 604, an external antenna 605, an external keypad 606 and an external display 607 are connected  
35 to the wireless terminal 403e. The external processor 604 includes a Ground Positioning System GPS which registers the position of the wireless communication terminal 403e.

The subscriber identity module 201a (see Figure 3) of the  
40 subscriber identity unit 303c can either function as a

subscriber identity module to the wireless terminal 403d or as a subscriber identity module of the authentication arrangement 1e. In an embodiment of the present invention the wireless terminal 403e get under control of the subscriber identity unit 303 when  
5 the transceiver 401 detects the presence of the remote subscriber identity unit 303c. In a GSM network, this results in that all communication with the base transceiver station BTS1 over a communication channel CH uses the antenna 605 (see Figure 1).

10

The wireless communication terminal can for instance be installed in a car wherein the transceiver 401, the microphone 602, the speaker 603, the processor 604, the antenna 605, the keypad 606 and the display 607 are all equipment of the car.

15

Dialling, answering and other operations can be made by either using the keypad 606 built into the car or by voice control using the microphone 602 built into the car. Alternatively, a keypad of the wireless terminal 403d can be used for dialling, answering and other operations. It is an advantage that an

20

excellent hands-free environment is achieved in the car. It is a further advantage that no cables or electronics are necessary to use in order to connect the equipment of the car to the wireless terminal 403e, i.e. it is a further advantage that the wireless terminal 403e does not have to be physically connected to the

25

equipment of the car.

Figure 8 illustrates in a flowchart a method according to the present invention for communication of subscriber identity module related data 901 (see Figure 9) in a wireless  
30 communication system. The reference signs referred to in the following text are found in the previous Figures.

35

The method in Figure 8 starts at a start position 801. In a next step 802 the subscriber identity 902 is assigned to the subscriber identity module 201. In a next step 803 the subscriber identity unit 303 is separated from the first wireless communication terminal 403. In a next step 804 communication is established over the local wireless communication link 404 between the first communication means 304  
40 of the subscriber identity unit 303 and the second communication

means 401 of the first wireless communication terminal 403. In a next step 805 subscriber identity module related data 901 is communicated via the first communication means 304 arranged in the subscriber identity unit 303 with the second communication means 401 arranged in the first wireless communication terminal 403 over the local wireless communication link 404. Finally, the method ends in an end position 806.

Figure 9 illustrates in a diagram a signalling communication between the wireless communication terminal 403, the subscriber identity unit 303a and the base station BTS1 of the wireless communication system 101 which is a GSM network (see Figure 1). The base station BTS1, the wireless communication terminal 403 and the subscriber identity unit 303a are illustrated in a block scheme in Figure 6a.

In a first step 903 and a second step 904 the subscriber identity unit 303a and the wireless terminal 403 are initiating communication with each other over the local wireless link 404 (see Figure 4). Subscriber identity module related data 901 such as the subscriber identity 902 is communicated during the steps 903 and 904. Also, the wireless communication terminal 403 is given authentication to communicate in the wireless communication system 101 during the steps 903 and 904. Also, the wireless communication terminal 403 is assigned to be the default terminal for incoming calls from the base station BTS1, i.e. incoming calls from the base station BTS1 will be routed to the wireless communication terminal 403, during the steps 903 and 904. In a signalling communication in a GSM network as in Figure 9, the subscriber identity 902 is the International Mobile Subscriber Identity (IMSI). In a next step 905 a communication is established via the local wireless link 404c (see Figure 6a) between the subscriber identity unit 303a and the wireless terminal 403.

In a next step 906 a call is made from the base station BTS1 to the wireless communication terminal 403. In a next step 907 the wireless communication terminal 403 answers the call from the base station BTS1. Finally, in a next step 908, a call

signalling communication is set-up between the base station BTS1 and the wireless communication terminal 403.

5 It shall be mentioned that the subscriber identity module (see Figure 3) of the subscriber identity unit 303a contains different types of data; the subscriber identity 902, temporary network data and service related data. The subscriber identity 902 has been entered by the network operator and can not be changed by the user. Temporary network data, such as location  
10 information, is updated by the wireless terminal 403 with information sent by the network. Service related data, such as abbreviated dialling numbers, is handled by the user when access conditions are fulfilled.



**CLAIMS**

1. An arrangement (1; 1a; 1b; 1c; 1d; 1e) for communication of subscriber identity module related data (901) in a wireless communication system (101), which arrangement comprises at least a first wireless communication terminal (403; 403a; 403b; 403e; 403f) and a subscriber identity unit (303; 303a; 303b; 303c), wherein the subscriber identity unit (303; 303a; 303b; 303c) is adapted to comprise a subscriber identity module (201; 201a) to which a subscriber identity (902) is assigned, and wherein the subscriber identity unit (303; 303a; 303b; 303c) includes means for giving authentication to the first wireless communication terminal (403; 403a; 403b; 403e; 403f) in the wireless communication system (101),

characterised in that the subscriber identity unit (303; 303a; 303b; 303c) comprises a first communication means (304) and that the first wireless communication terminal (403; 403a; 403b; 403e; 403f) comprises a second communication means (401; 401a; 401b), wherein the first communication means (304) is arranged to communicate the subscriber identity module related data (901) with the second communication means (401; 401a; 401b) over a local wireless communication link (404; 404a; 404b; 404c; 404d).

2. An arrangement (1; 1a; 1b; 1c; 1d; 1e) according to claim 1,

characterised in that the subscriber identity module related data (901) is at least the subscriber identity (902) wherein the first wireless communication terminal (403; 403a; 403b; 403e; 403f) is given authentication in the wireless communication system (101).

3. An arrangement (1; 1a; 1b; 1c; 1d; 1e) according to anyone of claims 1 or 2,

characterised in that the subscriber identity unit (303; 303a; 303b; 303c) is separated from the first wireless communication terminal (403; 403a; 403b; 403e; 403f).

4. An arrangement (1; 1c; 1d) according to anyone of claims 1-3,

characterised in that the subscriber identity unit (303; 303a; 303b; 303c) is comprised in a subscriber identity terminal (302).

5. An arrangement (1a; 1b; 1e) according to anyone of claims 1-3,

characterised in that the subscriber identity unit (303; 303a; 303b; 303c) is comprised in a second wireless communication terminal (403c; 403d).

6. An arrangement according to anyone of the preceding claims,

characterised in that the arrangement comprises at least two wireless communication terminals (403; 403a; 403b; 403e; 403f), wherein the subscriber identity module related data (901) is arranged to communicate with at least one of the wireless communication terminals (403; 403a; 403b; 403e; 403f) at a time.

7. An arrangement (1; 1a; 1b; 1c; 1d; 1e) according to anyone of the preceding claims,

characterised in that the local wireless communication link (404; 404a; 404b; 404c; 404d) is within the radio frequency range.

8. An arrangement (1; 1a; 1b; 1c; 1d; 1e) according to claim 7,

characterised in that the local wireless communication link  
(404; 404a; 404b; 404c; 404d) is within the frequency range of  
5 approximately 2,4 GHz.

9. An arrangement (1; 1a; 1b; 1c; 1d; 1e) according to anyone of  
claims 1-6,

10 characterised in that the local wireless communication link  
(404; 404a; 404b; 404c; 404d) is within the infrared frequency  
range.

10. A station (302; 303; 303a; 303b; 303c; 403c; 403d) in a  
15 wireless communication system (101) comprising a subscriber  
identity unit (303; 303a; 303b; 303c) which subscriber identity  
unit (303; 303a; 303b; 303c) is adapted to comprise a subscriber  
identity module (201; 201a) to which a subscriber identity (902)  
is assigned, and wherein the subscriber identity unit (303;  
20 303a; 303b; 303c) includes means for giving authentication to a  
first wireless communication terminal (403; 403a; 403b; 403e;  
403f) in the wireless communication system (101),

characterised in that the subscriber identity unit (303;  
25 303a; 303b; 303c) comprises a first communication means (304)  
which is arranged to communicate subscriber identity module  
related data (901) over a local wireless communication link  
(404; 404a; 404b; 404c; 404d).

30 11. A station according to claim 10,

characterised in that the subscriber identity module related  
data (901) is at least the subscriber identity (902).

12. A station (303; 303a; 303b; 303c) according to anyone of claims 10 or 11,

characterised in that the station is the subscriber identity  
5 unit (303; 303a; 303b; 303c).

13. A station (302) according to anyone of claims 10 or 11,

characterised in that the station is a subscriber identity  
10 terminal (302).

14. A station (403c; 403d) according to anyone of claims 10 or 11,

15 characterised in that the station is a wireless communication terminal (403c; 403d).

15. A station according to anyone of claims 10-14,

20 characterised in that the local wireless communication link (404; 404a; 404b; 404c; 404d) is within the radio frequency range.

16. A station according to claim 15,

25

characterised in that the local wireless communication link (404; 404a; 404b; 404c; 404d) is within the frequency range of approximately 2,4 GHz.

30 17. A station according to anyone of claims 10-14,

characterised in that the local wireless communication link (404; 404a; 404b; 404c; 404d) is within the infrared frequency range.

35

18. A method for communication of subscriber identity module related data (901) in a wireless communication system (101) for at least a first wireless communication terminal (403; 403a; 403b; 403e; 403f) which method is using a subscriber  
40 identity unit (303; 303a; 303b; 303c), wherein the subscriber

identity unit (303; 303a; 303b; 303c) is adapted to comprise a subscriber identity module (201; 201a), and wherein the subscriber identity unit (303; 303a; 303b; 303c) includes means for giving authentication to the first wireless communication terminal (403; 403a; 403b; 403e; 403f) in the wireless communication system (101), the method comprising the steps of:

- assigning a subscriber identity (902) to the subscriber identity module (201; 201a);

characterised by

- establishing communication over a local wireless communication link (404; 404a; 404b; 404c; 404d) at least from a first communication means (304) of the subscriber identity unit (303; 303a; 303b; 303c) to a second communication means (401; 401a; 401b) of the first wireless communication terminal (403; 403a; 403b; 403e; 403f); and

- communicating the subscriber identity module related data (901) via the first communication means (304) with the second communication means (401; 401a; 401b) over the local wireless communication link (404; 404a; 404b; 404c; 404d).

19. A method according to claim 18,

characterised by

- communicating the subscriber identity module related data (901) which is at least the subscriber identity (902); and

- giving authentication to the first wireless communication terminal (403; 403a; 403b; 403e; 403f) in the wireless

communication system (101).

20. A method according to anyone of claims 18 or 19,

characterised by separating the subscriber identity unit (303;  
303a; 303b; 303c) from the first wireless communication terminal  
5 (403; 403a; 403b; 403e; 403f).

21. A method according to anyone of claims 18-20,

characterised by comprising the subscriber identity unit (303;  
10 303a; 303b; 303c) in a subscriber identity terminal (302).

22. A method according to anyone of claims 18-20,

characterised by comprising the subscriber identity unit (303;  
15 303a; 303b; 303c) in a second wireless communication terminal  
(403c; 403d).

23. A method according to anyone of claims 18-22,

20 characterised by communicating the subscriber identity module  
related data (901) with at least one of at least two wireless  
communication terminals (403; 403a; 403b; 403e; 403f) at a time.

24. A method according to claim 23,

25

characterised by communicating the subscriber identity module  
related data (901) with one of at least two wireless  
communication terminals (403; 403a; 403b; 403e; 403f) at a time.

30 25. A method according to claim 24,

characterised by routing an incoming call to the one of the  
wireless communication terminals (403; 403a; 403b; 403e; 403f)  
that get under control of the subscriber identity unit (303;  
35 303a; 303b; 303c).

26. A method according to claim 24,

characterised by routing an outgoing call from the one of the  
40 wireless communication terminals (403; 403a; 403b; 403e; 403f)

that get under control of the subscriber identity unit (303; 303a; 303b; 303c).

27. A method according to claim 24,

5

characterised by routing an incoming call to one of the wireless communication terminals (403; 403a; 403b; 403e; 403f) in accordance with a mutual precedence between the wireless communication terminals (403; 403a; 403b; 403e; 403f).

10

28. A method according to claim 24,

characterised by routing an outgoing call from one of the wireless communication terminals (403; 403a; 403b; 403e; 403f) in accordance with a mutual precedence between the wireless communication terminals (403; 403a; 403b; 403e; 403f).

15

29. A method according to anyone of claims 27 or 28,

20 characterised by comprising information in a memory (502) of the subscriber identity unit (303; 303a; 303b; 303c) about the mutual precedence.

30. A method according to anyone of claims 27 or 28,

25

characterised by varying the mutual precedence depending on which type of services that an incoming call or an outgoing call respectively provides.

30 31. A method according to anyone of claims 27 or 28,

characterised by determining the mutual precedence automatically by means of the subscriber identity unit (303; 303a; 303b; 303c).

35

32. A method according to anyone of claims 27 or 28,

characterised by determining the mutual precedence automatically by means of a subscriber identity (902) of an incoming call.

40

33. A method according to anyone of claims 27 or 28,

characterised by determining the mutual precedence manually by  
5 means of the wireless communication terminals (403; 403a; 403b;  
403e; 403f) via a user interface of either the subscriber  
identity unit (303; 303a; 303b; 303c) or of one of the wireless  
communication terminals (403; 403a; 403b; 403e; 403f).

10 34. A method according to anyone of claims 18-33,

characterised by communicating the subscriber identity module  
related data (901) over the local wireless communication link  
(404; 404a; 404b; 404c; 404d) which is within the radio  
15 frequency range.

35. A method according to claim 34,

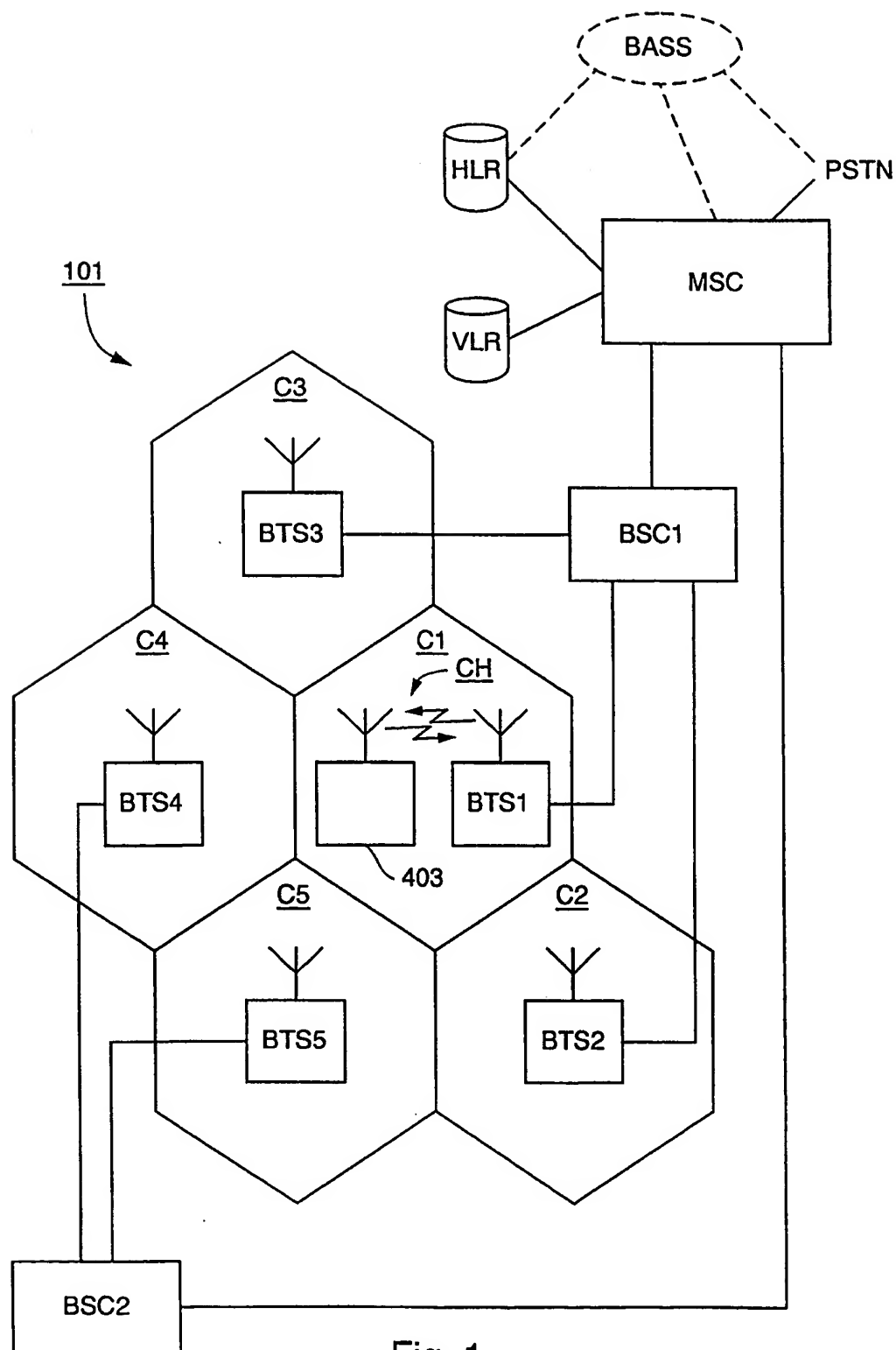
characterised by communicating the subscriber identity (902)  
20 over the local wireless communication link (404; 404a; 404b;  
404c; 404d) which is within the frequency range of approximately  
2,4 GHz.

36. A method according to anyone of claims 18-33,

25 characterised by communicating the subscriber identity (902)  
over the local wireless communication link (404; 404a; 404b;  
404c; 404d) which is within the infrared frequency range.



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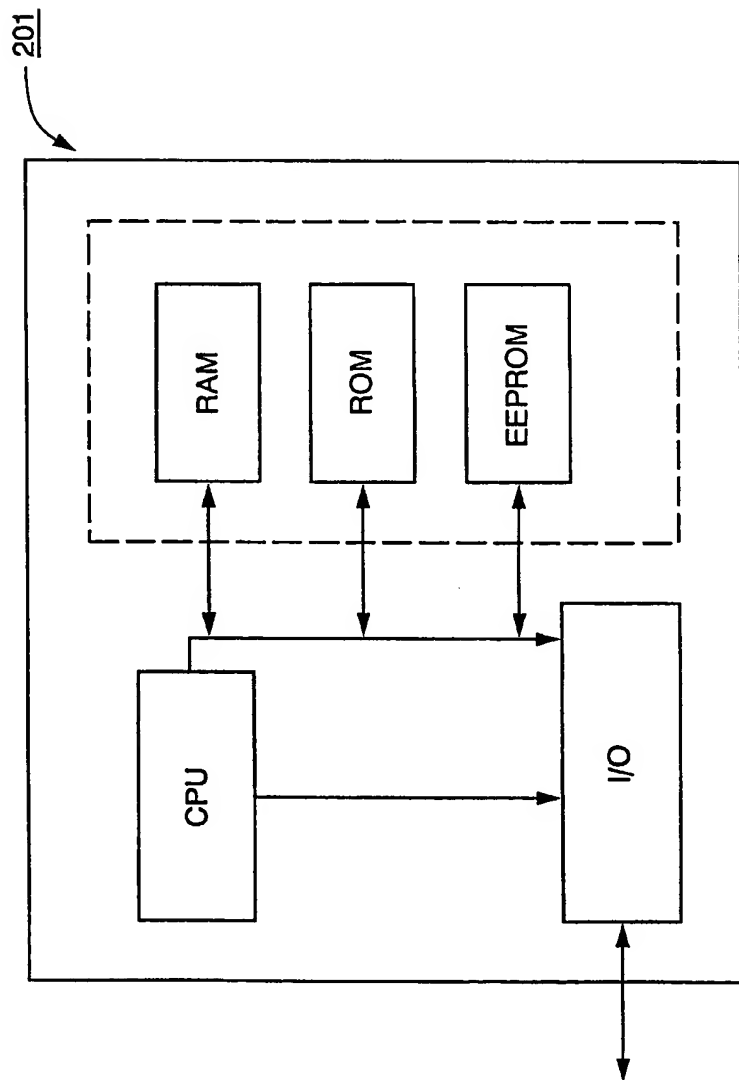


Fig. 2

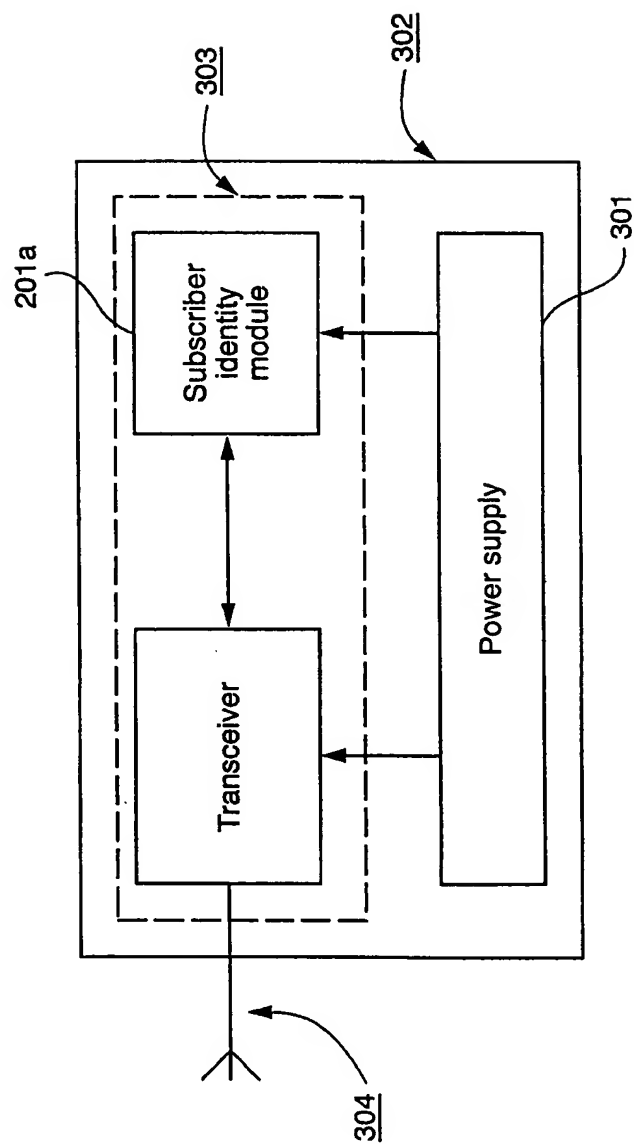


Fig. 3

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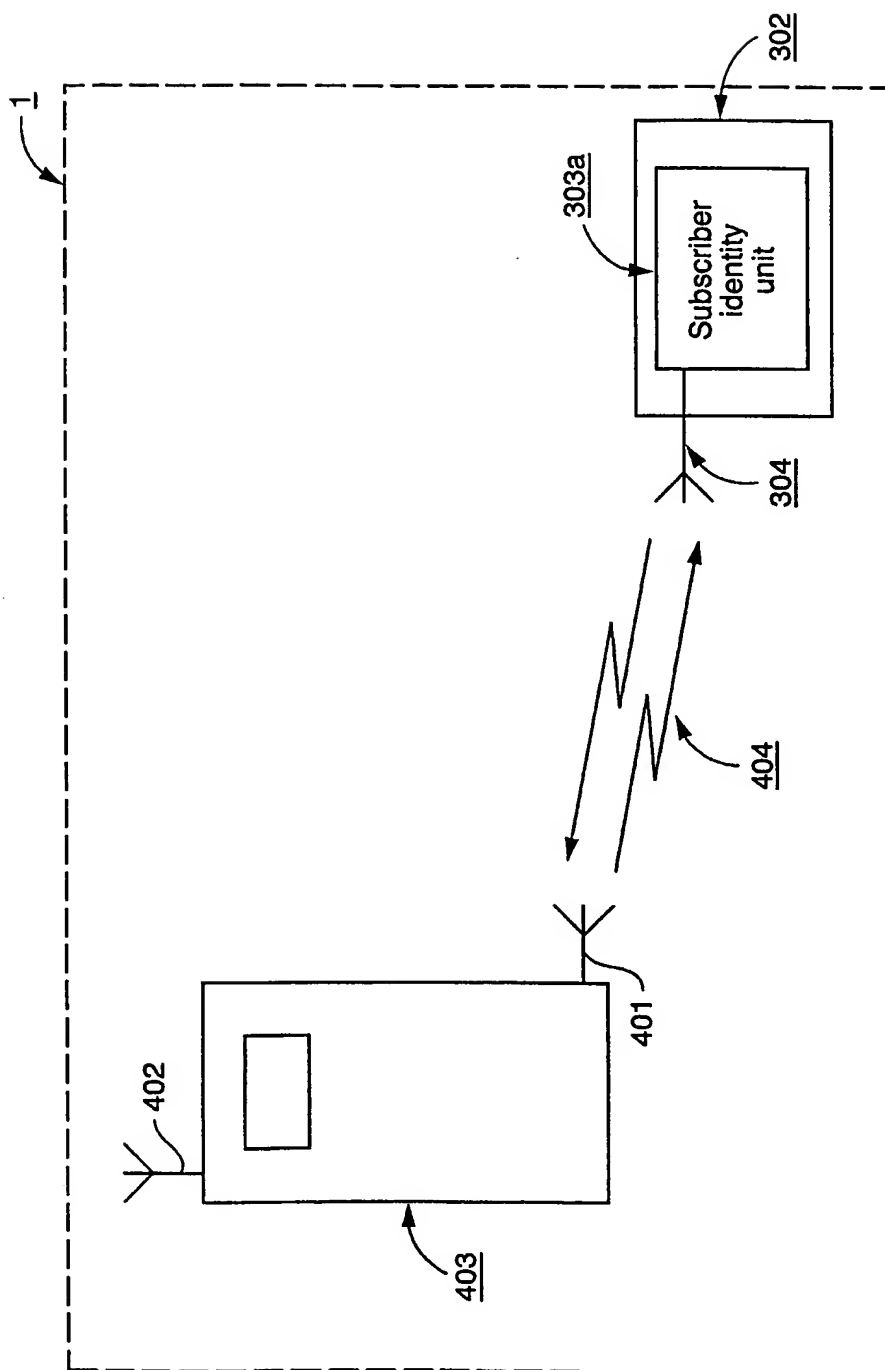


Fig. 4

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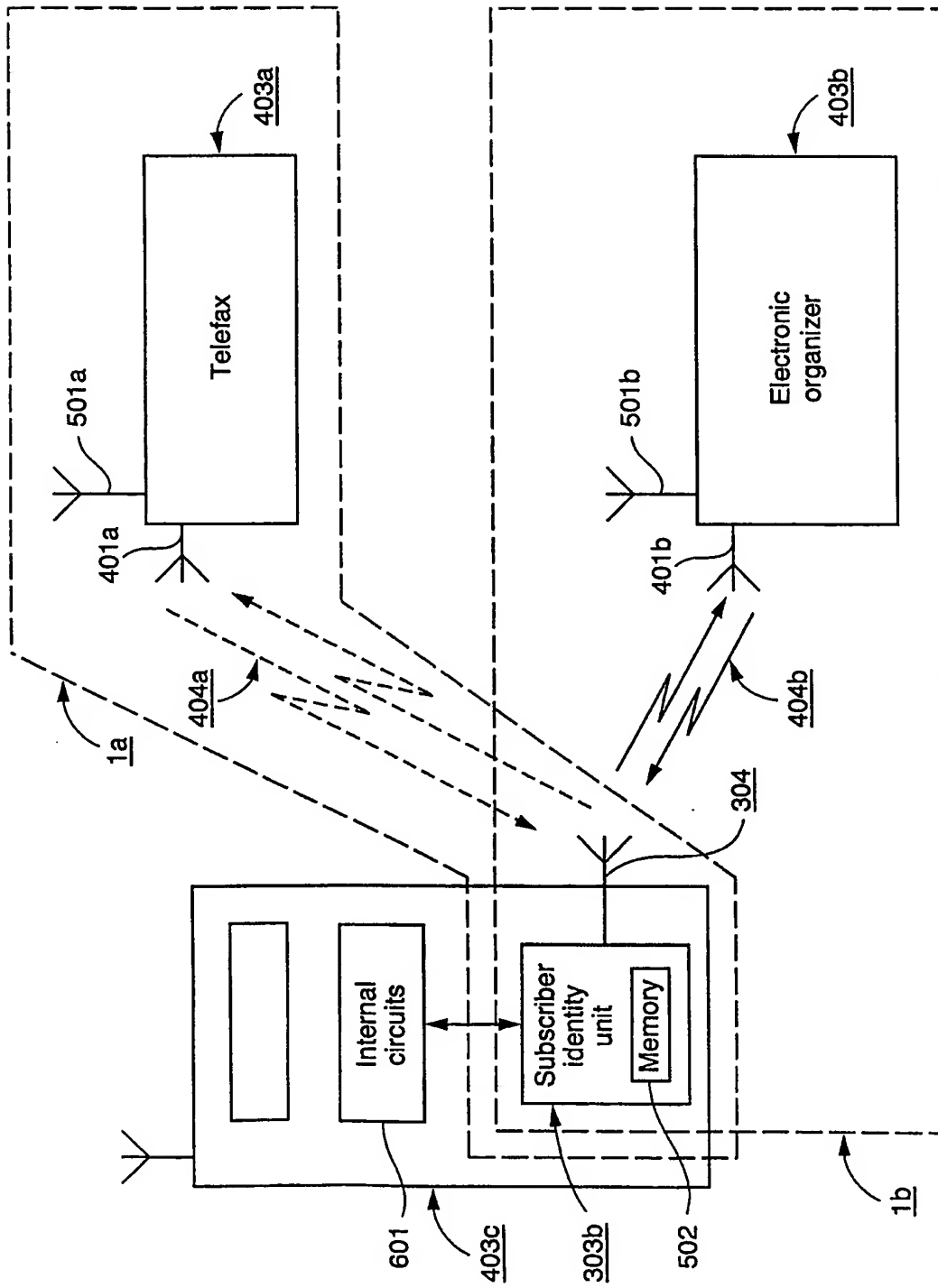


Fig. 5

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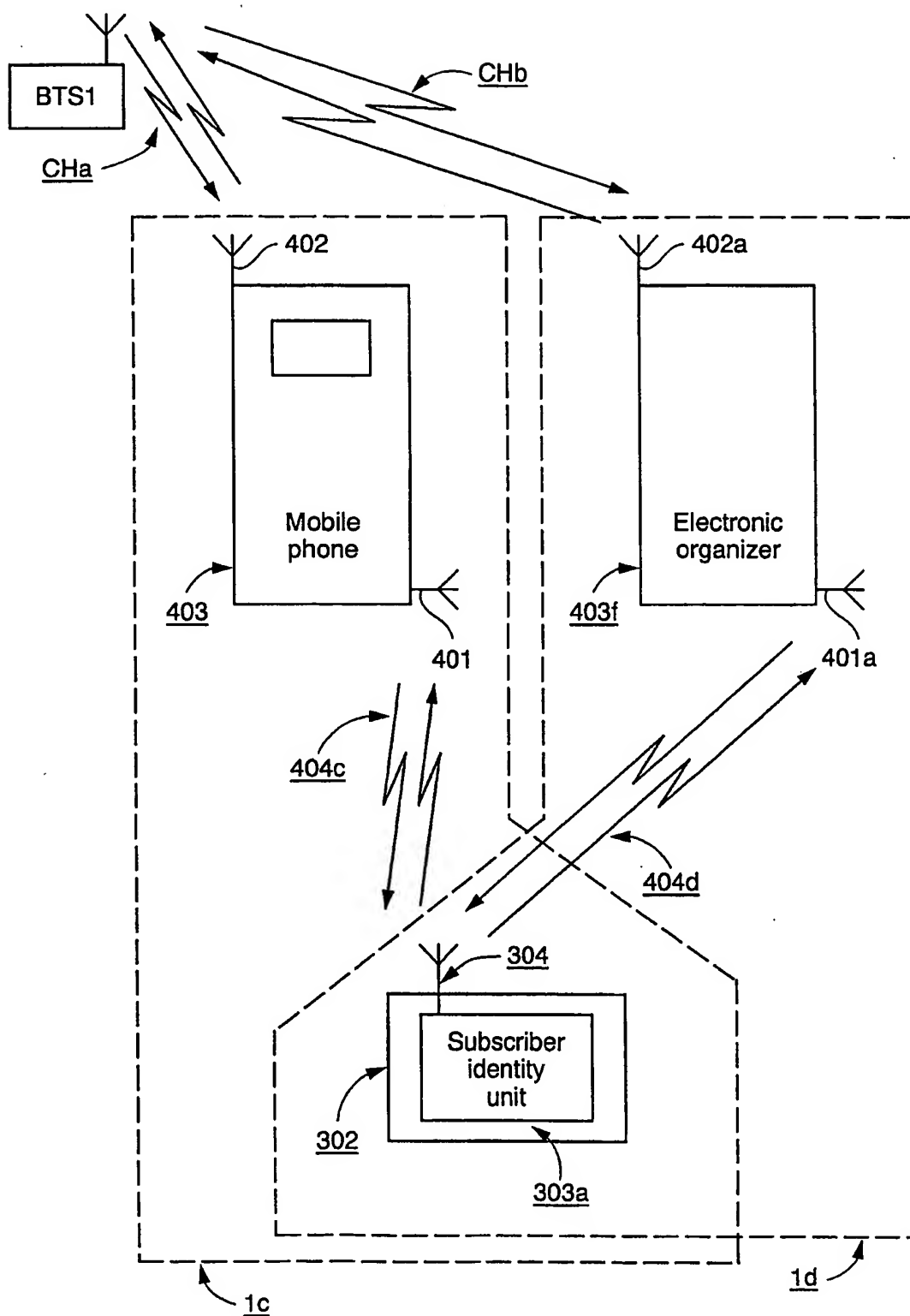


Fig. 6a

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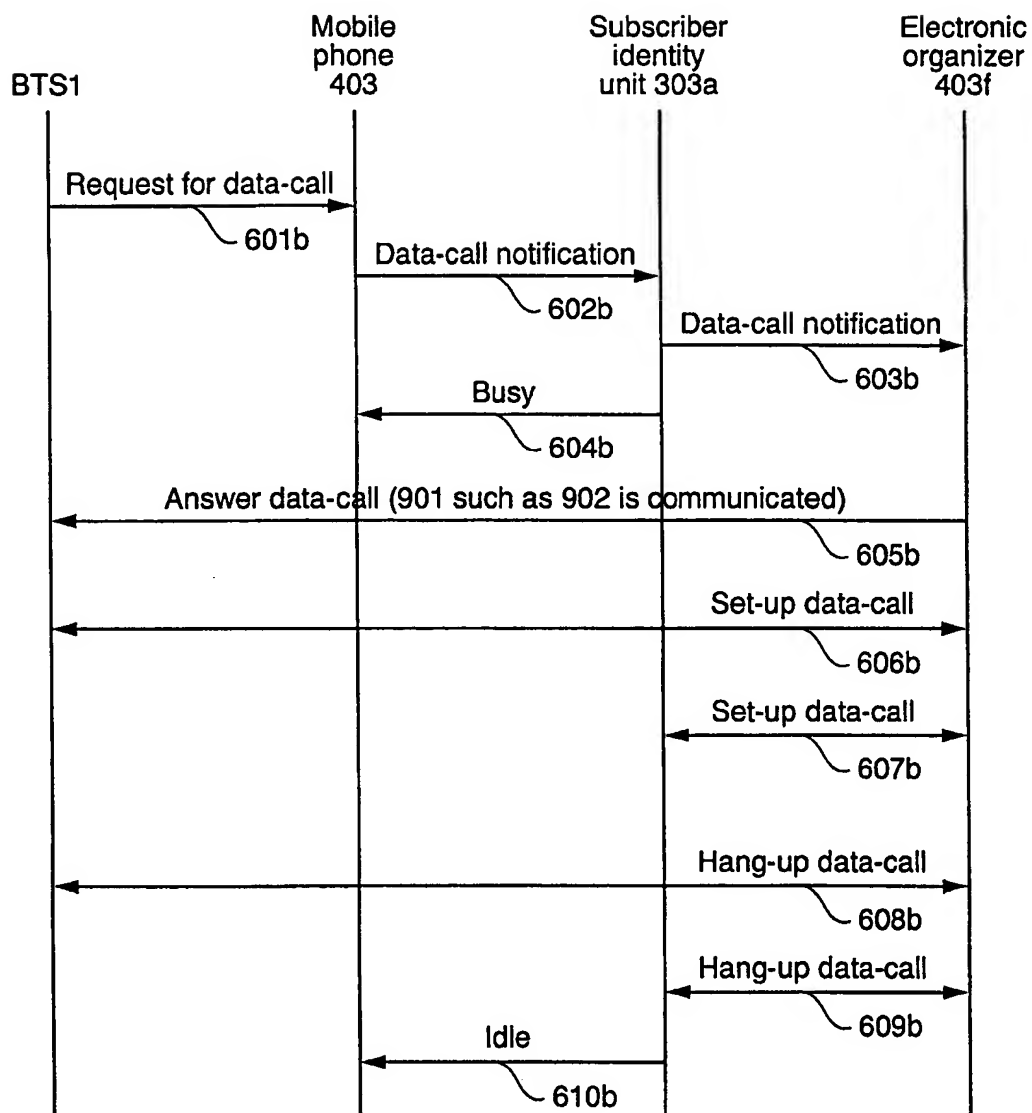


Fig. 6b

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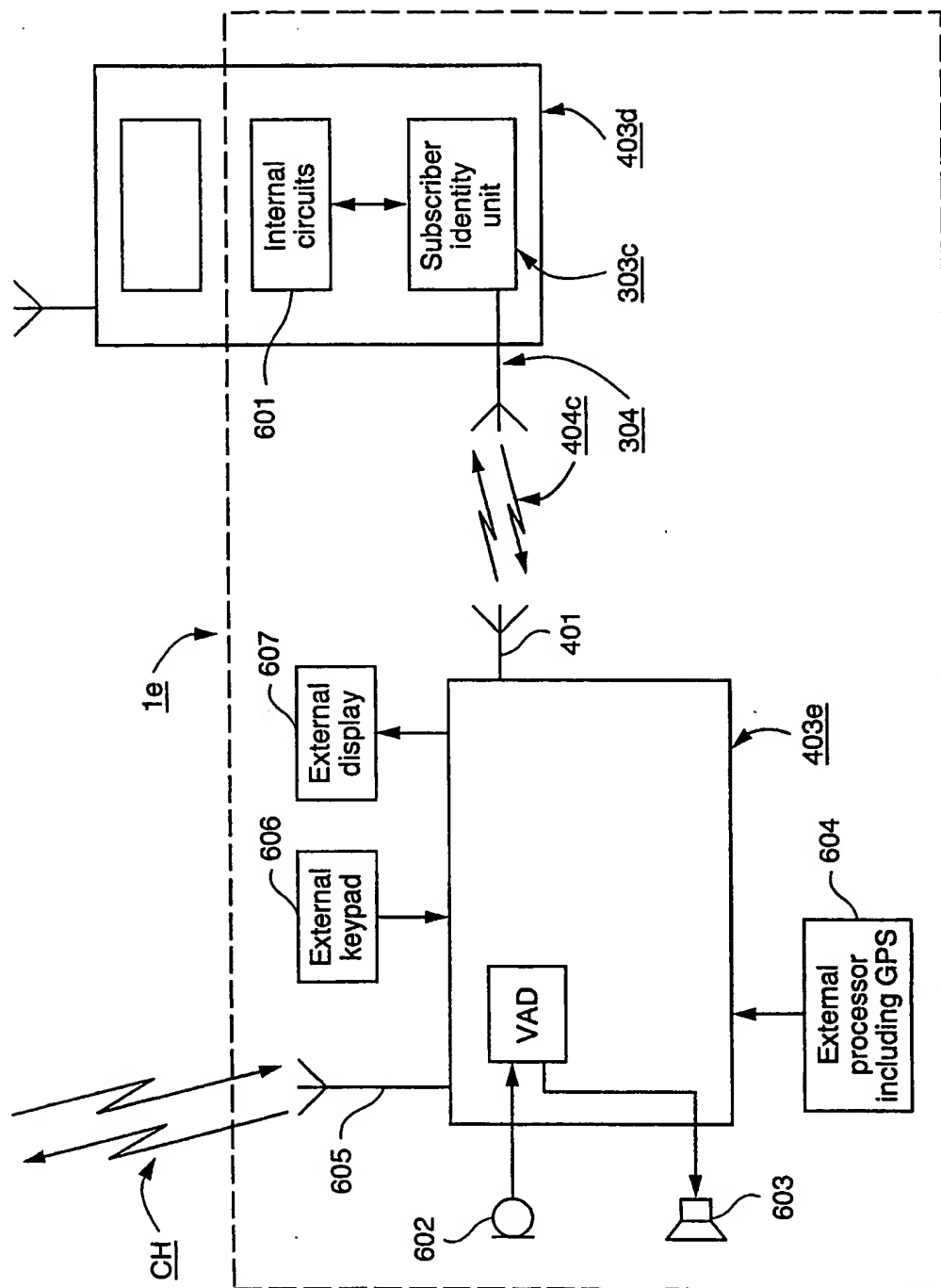


Fig. 7



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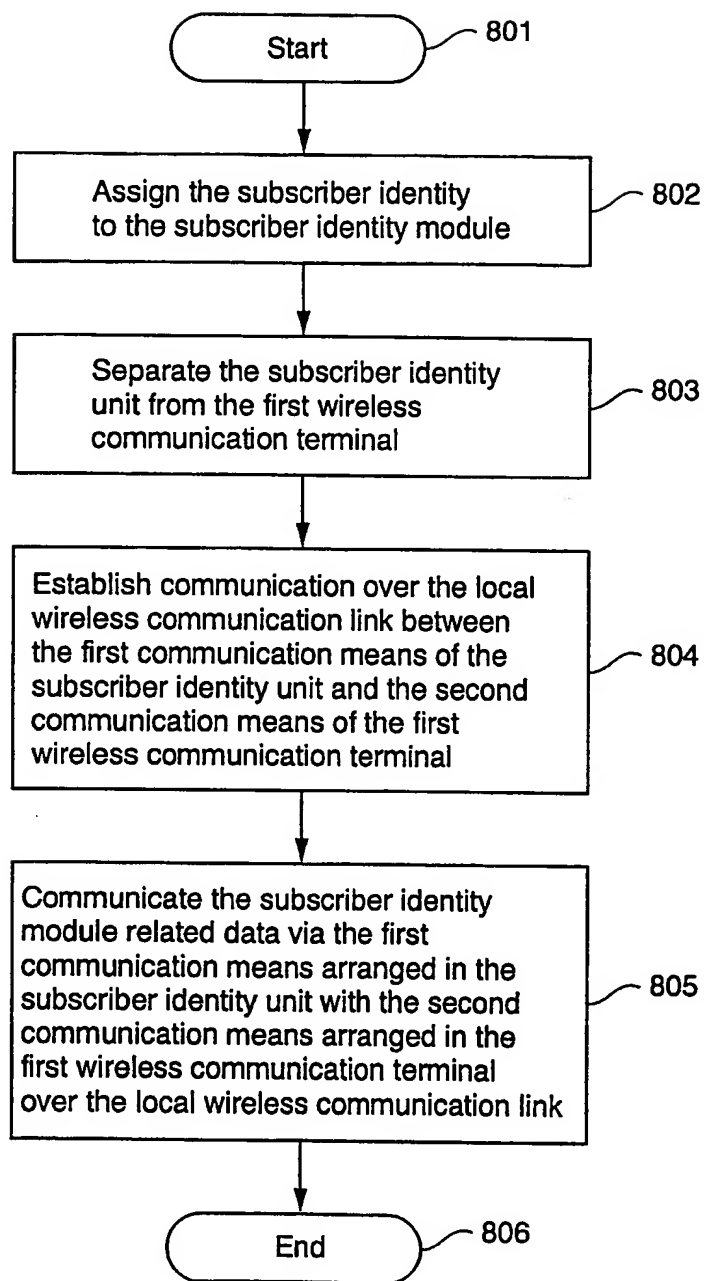


Fig. 8

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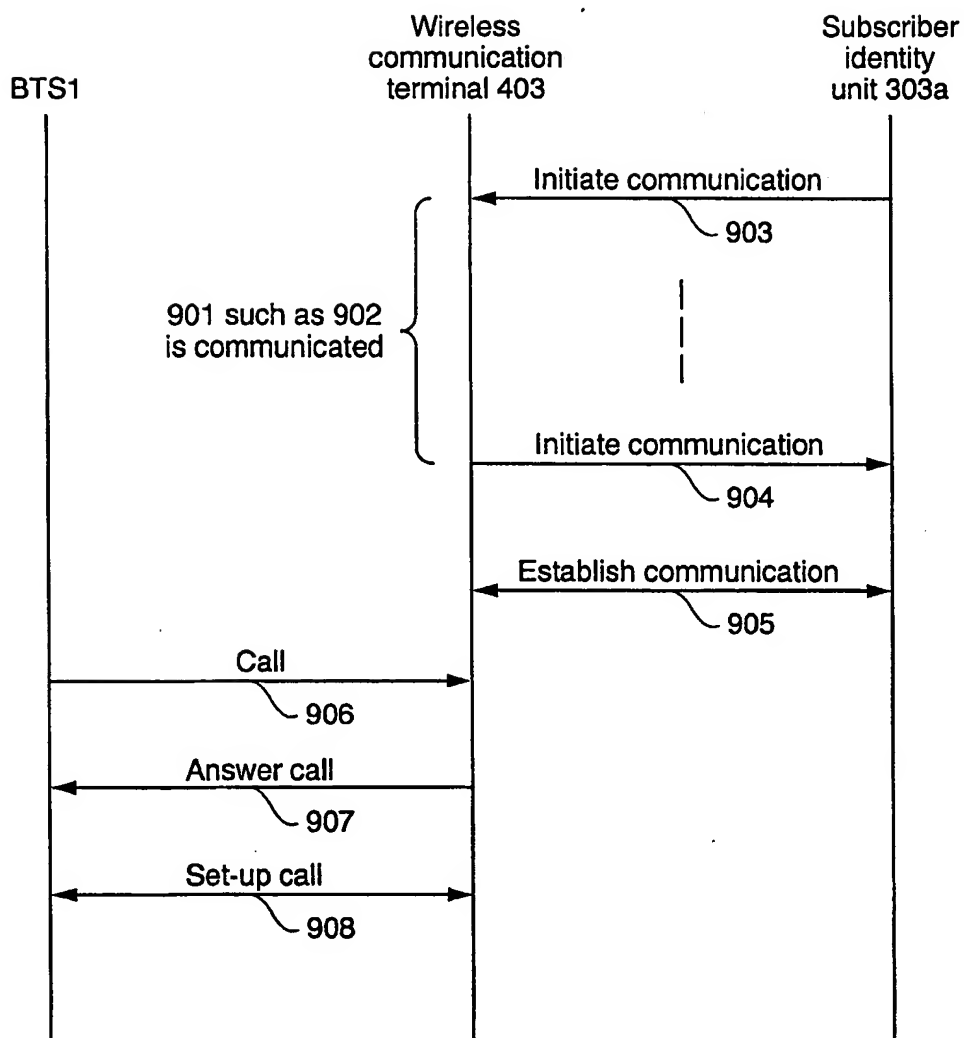


Fig. 9

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00734

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q, H04B, H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9611545 A1 (MOTOROLA INC.), 18 April 1996 (18.04.96), page 4, line 13 - page 5, line 16; page 10, line 14 - page 12, line 24 --	1-26,34-36
Y	GB 2304247 A (MOTOROLA INC. Y), 12 March 1997 (12.03.97), page 4, line 6 - line 26 --	1-26,34-36
A	EP 055592 A1 (NOKIA MOBILE PHONES LTD.), 18 August 1993 (18.08.93), see the whole document --	1-26,34-36
A	FR 2739952 A1 (GEMPLUS SOCIETE EN COMMANDITE PAR ACTIONS), 18 April 1997 (18.04.97), see the whole document --	1-36

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

27 Sept. 1999

Date of mailing of the international search report

29 -09- 1999

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Peter Hedman/cs

Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00734

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE 99/00734

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EP 055592 A1	18/08/93	NONE	
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WO 9858510 A1	23/12/98	AU 3022497 A AU 5649598 A WO 9858509 A	04/01/99 04/01/99 23/12/98